

12-06-07

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Practitioner's Docket No. **TRW(RG)5832****PATENT****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of: Kevin E. Boyle et al

Application No.: 10/075,669

Group No.: 3611

Filed: February 13, 2002

Examiner: D.S. Yeagley

For: **SELF-CENTERING STEERING SYSTEM****Mail Stop Appeal Brief--Patents****Commissioner for Patents****P.O. Box 1450****Alexandria, VA 22313-1450****TRANSMITTAL OF APPEAL BRIEF  
(PATENT APPLICATION—37C.F.R. 1.192)**

**Note:** The phrase "the date on which" an "appeal was taken" in 35 U.S.C. 154(b)(1)(A)(ii) (Which provides an adjustment of patent term if there is a delay on the part of the Office to respond within 4 months after an "appeal was taken") means the date on which an appeal brief under § 1.192 (and not a notice of appeal) was filed. Compliance with § 1.192 requires that: 1. the appeal brief fee (§ 1.17(c)) be paid (§ 1.192(a)); and 2. the appeal brief complies with § 1.192(c)(1) through (c)(9). See Notice of September 18, 2000, 65 Fed. Reg. 56366, 56385-56387 (Comment 38).

1. Transmitted herewith is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on **October 5, 2007**.

**NOTE:** "Appellant must, file a brief under this section within two months from the date of filing the notice of appeal under § 41.31.37 CFR 41.(a)(1). The brief is no longer required in triplicate. The former alternative time for filing a brief (within the time allowed for reply to the action from which the appeal was taken) has been removed. Appellant must file within two months from the notice of appeal. See Notice of August 12, 2004, 69 FR 49960, 49962.

**CERTIFICATION UNDER 37 CFR §§ 1.8(a) and 1.10\***

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\*Only the date of filing (§ 1.6) will be the date used in a patent term adjustment calculation, although the date on any certificate of mailing or transmission under § 1.8 continues to be taken into account in determining timeliness. See § 1.703(f). Consider "Express Mail Post Office Addressee" (§ 1.10) or facsimile transmission (§ 1.6(d)) for the reply to be accorded the earliest possible filing date for patent term adjustment calculations.

2. STATUS OF APPLICANT

This application is on behalf of

☒ other than a small entity.

☐ a small entity.

A statement

☐ is attached.

☐ was already filed.

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 § 41.20(b)(2), the fee for filing the Appeal Brief is:

☐ small entity \$255.00

☒ other than a small entity \$510.00

**Appeal Brief fee due \$510.00**

4. EXTENSION OF TERM

NOTE: 37 C.F.R. § 1.740(b) "...an applicant shall be deemed to have failed to engage in reasonable efforts to conclude processing or examination of an application for the cumulative total of any periods of time in excess of three months that are taken to reply to any notice or action by the Office making any rejection, objection, argument, or other request, measuring such three-month period from the date the notice or action was mailed or given to the applicant, in which case the period of adjustment set forth in § 1.703 shall be reduced by the number of days, if any, beginning on the date after the date that is three months after the date of mailing or transmission of the Office communication notifying the applicant of the rejection, objection, argument, or other request and ending on the date the reply was filed. The period, or shortened statutory period, for reply that is set in the Office action or notice has not effect on the three-month period set forth in this paragraph."

NOTE: The time periods set forth in 37 C.F.R. § 1.192(a) are subject to the provision of § 1.136 for patent applications. 37 C.F.R. § 1.191(d). See also Notice of November 5, 1985 (1060 O.G. 27).

NOTE: As the two-month period set in § 1.192(a) for filing an appeal brief is not subject to the six-month maximum period specified in 35 U.S.C. § 133, the period for filing an appeal brief may be extended up to seven months. 62 Fed. Reg. 53,131 at 53,156; 1203 O.G. 63 at 84 (Oct. 10, 1997).

The proceedings herein are for a patent application and the provisions of 37 C.F.R. 1.136 apply.

(complete (a) or (b), as applicable)

- (a) ☐ Applicant petitions for an extension of time under 37 C.F.R. § 1.136 (fees: 37 C.F.R. 1.17(a)(1)-(5)) for the total number of months check below:

| Extension (months)                    | Fee for other than small entity | Fee for small entity |
|---------------------------------------|---------------------------------|----------------------|
| <input type="checkbox"/> one month    | \$ 120.00                       | \$ 60.00             |
| <input type="checkbox"/> two months   | \$ 460.00                       | \$ 230.00            |
| <input type="checkbox"/> three months | \$1,050.00                      | \$ 525.00            |
| <input type="checkbox"/> four months  | \$1,640.00                      | \$ 820.00            |
| <input type="checkbox"/> five months  | \$2,230.00                      | \$1,115.00           |

Fee \$\_\_\_\_\_

If an additional extension of time is required, please consider this a petition therefor.

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Extension fee due with this request \$= \_\_\_\_\_

or

(b) ☐ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition for extension of time.

**5. TOTAL FEE DUE**

The total fee due is:

Appeal brief fee \$510.00

Extension fee (if any) \$ \_\_\_\_\_

**TOTAL FEE DUE \$510.00**

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**AND/OR**

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**SIGNATURE OF PRACTITIONER**

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PATENT



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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant : Kevin E. Boyle et al.  
 Serial No. : 10/075,669  
 Filing Date : February 13, 2002  
 For : SELF-CENTERING STEERING SYSTEM  
 Group Art Unit : 3611  
 Examiner : Daniel S. Yeagley  
 Attorney Docket No. : TRW(RG)5832

**Mail Stop Appeal Brief - Patents**  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

**APPEAL BRIEF**

Sir:

Following the Notice of Appeal filed October 5, 2007, Appellants present this Appeal Brief.

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**I. REAL PARTY IN INTEREST**

The real party in interest is TRW Automotive U.S. LLC. An assignment of this application to TRW Inc. was recorded February 13, 2002, Reel/Frame: 012609/0605. An assignment of this applictaion from TRW Inc. to TRW Automotive U.S. LLC has not been recorded.

**II. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences.

**III. STATUS OF CLAIMS**

Claims 31-44 and 60-68 are currently pending in this application. Claims 37, 38, and 66 are withdrawn. Claims 1-30 and 45-59 are canceled. Claims 31, 41, and 42 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,694,925 to Roberts et al. (hereinafter, Roberts) in view of U.S. Patent No. 5,129,474 to Rauter et al. (hereinafter, Rauter). Claims 32-36, 39-40, 43, and 60-65 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts as modified by Rauter and in further view of U.S. Patent No. 5,007,494 to Ohmura et al. (hereinafter, Ohmura). Claim 44 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts as modified by Rauter and in further view of U.S. Patent No. 4,837,692 to Shimizu (hereinafter, Shimizu). The rejections of claims 31-36, 39-44, and 60-65 are appealed.

**IV. STATUS OF AMENDMENTS**

An Amendment After Final Rejection was filed on July 5, 2007. An Advisory Action dated July 20, 2007 indicated that the Amendment After Final Rejection was

entered. The Advisory Action maintained the rejections of claims 31-36, 39-44, and 60-65 under 35 U.S.C. 103(a).

**V. SUMMARY OF THE CLAIMED SUBJECT MATTER**

Independent claim 31 recites a steering system 10, 10a, 10b for a vehicle 16, 16a, 16b having first and second steerable wheels 12, 12a, 12b, and 14, 14a, 14b (Page 5, lines 9-11 and Figs 1, 7, 10). The steering system 10, 10a, 10b includes an axle 20, 20a, 20b having first and second end portions 32, 34, 34a, 34b which are suspended by springs 40, 40a, 40b, and 42, 42a, 42b which support the first and second steerable wheels 12, 12a, 12b of the vehicle 16, 16a, 16b (Page 5, line 15 to Page 6, line 23; and Figs. 1, 7, and 10). The axle 20, 20a, 20b has an intermediate portion 50 which at least partially defines a chamber 30 through which a longitudinal central axis 22, 22a, 22b of the axle 20, 20a, 20b extends (Page 7, lines 1-8 and Figs. 1, 2, 5, 7, and 10). The first steerable wheel 12, 12a, 12b is pivotally mounted on the first end portion 32 of the axle 20, 20a, 20b for pivotal movement about a first pivot axis which extends transverse to the longitudinal central axis 22, 22a, 22b of the axle 20, 20a, 20b (Page 6, lines 6-12 and Figs. 1, 7, and 10). The second steerable wheel 14, 14a, 14b is pivotally mounted on the second end portion 34, 34a, 34b of the axle 20, 20a, 20b for pivotal movement about a second pivot axis which extends transverse to the longitudinal central axis 22, 22a, 22b of the axle 20, 20a, 20b (Page 6, lines 12-17 and Figs. 1, 7, and 10).

The steering system 10, 10a, 10b further includes a steering member 66, 66a, 66b having a longitudinal central axis (Page 8, lines 5-6 and Figs. 1-12). The steering member 66, 66a, 66b is supported in the chamber 30 in the axle 20, 20a, 20b for movement along a linear path relative to the axle 20, 20a, 20b (Page 8, lines

6-12 and Figs. 1-6, 7, and 10). The steering member 66, 66a, 66b has a screw thread portion 70, 70a, 70b disposed between first and second ends 118, 72 of the steering member 66, 66a, 66b (Page 8, lines 12-20; Page 11, lines 5-7; and Figs. 1-3, 5, 7, and 10). A ball nut 90, 90a, 90b associated with the screw thread portion 70, 70a, 70b of the steering member 66, 66a, 66b and disposed in the chamber 30 in the axle 20, 20a, 20b (Page 9, line 23 to Page 10, line 9; and Figs. 1, 2, 5-7, and 10).

An electric motor 78 is connected with the axle 20, 20a, 20b (Page 9, lines 3-5 and Figs. 1, 2, 5-7, and 10). At least one drive member 88 is connected with the electric motor 78 and the ball nut 90, 90a, 90b to rotate the ball nut 90, 90a, 90b to move the steering member 66, 66a, 66b in the chamber 30 in the axle 20, 20a, 20b upon actuation of the electric motor 78 (Page 9, lines 17-22; Page 10, lines 9-15; and Figs. 1, 2, 5-7, and 10).

A takeoff assembly 98 connected to the first end 118 of the steering member 66, 66a, 66b has a portion 120, 122 projecting from an opening 52 in the intermediate portion 50 of the axle 20, 20a, 20b (Page 7, lines 2-8; Page 10, lines 15-21; Page 11, lines 14-16; and Figs. 1-4, 7, and 10). The takeoff assembly 98 is movable with the steering member 66, 66a, 66b along the linear path upon rotation of the ball nut 90, 90a, 90b (Page 14, line 21 to Page 15, line 2; and Figs. 1-6, 7, and 10).

A first steering linkage 124, 124a, 124b connected with the projecting portion 120, 122 of the takeoff assembly 98 extends along an outer side 28 of the axle 20, 20a, 20b to transmit movement from the takeoff assembly 98 to the first steerable wheel 12, 12a, 12b upon movement of the steering member 66, 66a, 66b and the takeoff assembly 98 along the linear path (Page 5, line 22 to Page 6, line 1; Page 11,



lines 14-16; and Figs. 1-6, 7, and 10). The first steering linkage 124, 124a, 124b is pivotally connected to the first steerable wheel 12, 12a, 12b to effect pivotal movement of the first steerable wheel 12, 12a, 12b about the first pivot axis upon movement of the steering member 66, 66a, 66b and the takeoff assembly 98 along the linear path (Page 11, lines 16-23 and Figs. 1-6, 7, and 10).

A second steering linkage 126, 126a, 126b connected with the projecting portion 120, 122 of the takeoff assembly 98 extends along the outer side 28 of the axle 20, 20a, 20b to transmit movement of the takeoff assembly 98 to the second steerable wheel 14, 14a, 14b upon movement of the steering member 66, 66a, 66b and the takeoff assembly 98 along the linear path (Page 5, line 22 to Page 6, line 1; Page 11, lines 16-18; and Figs. 1-6, 7, and 10). The second steering linkage 126, 126a, 126b is pivotally connected to the second steerable wheel 14, 14a, 14b to effect pivotal movement of the second steerable wheel 14, 14a, 14b about the second pivot axis upon movement of the steering member 66, 66a, 66b and the takeoff assembly 98 along the linear path (Page 11, lines 16-23 and Figs. 1-6, 7, and 10).

Independent claim 60 recites a steering system 10, 10a, 10b for a vehicle 16, 16a, 16b having first and second steerable wheels 12, 12a, 12b, and 14, 14a, 14b (Page 5, lines 9-11 and Figs 1, 7, 10). The steering system 10, 10a, 10b includes an axle 20, 20a, 20b having first and second end portions 32, 34, 34a, 34b which are suspended by springs 40, 40a, 40b, and 42, 42a, 42b which support the first and second steerable wheels 12, 12a, 12b of the vehicle 16, 16a, 16b (Page 5, line 15 to Page 6, line 23; and Figs. 1, 7, and 10). The axle 20, 20a, 20b has an intermediate portion 50 which at least partially defines a chamber 30 through which a longitudinal

central axis 22, 22a, 22b of the axle 20, 20a, 20b extends (Page 7, lines 1-8 and Figs. 1, 2, 5, 7, and 10). The first steerable wheel 12, 12a, 12b is pivotally mounted on the first end portion 32 of the axle 20, 20a, 20b for pivotal movement about a first pivot axis which extends transverse to the longitudinal central axis 22, 22a, 22b of the axle 20, 20a, 20b (Page 6, lines 6-12 and Figs. 1, 7, and 10). The second steerable wheel 14, 14a, 14b is pivotally mounted on the second end portion 34, 34a, 34b of the axle 20, 20a, 20b for pivotal movement about a second pivot axis which extends transverse to the longitudinal central axis 22, 22a, 22b of the axle 20, 20a, 20b (Page 6, lines 12-17 and Figs. 1, 7, and 10).

The steering system 10, 10a, 10b further includes a steering member 66, 66a, 66b having a longitudinal central axis (Page 8, lines 5-6 and Figs. 1-12). The steering member 66, 66a, 66b is supported in the chamber 30 in the axle 20, 20a, 20b for axial movement relative to the axle 20, 20a, 20b (Page 8, lines 6-12 and Figs. 1-6, 7, and 10). The steering member 66, 66a, 66b is movable between a straight ahead position and positions offset from the straight ahead position of the steering member 66, 66a, 66b (Page 14, line 23 to Page 15, line 3; Page 20, line 10-13; and Figs. 1, 2, 7-9, 10). The steering member 66, 66a, 66b has a screw thread portion 70, 70a, 70b (Page 8, lines 12-20 and Figs. 1-3, 5, 7, and 10).

A spring assembly 130, 130a, 130b, 132, 132a, 132b disposed in the chamber 30 in the axle 20, 20a, 20b is connected with the steering member 66, 66a, 66b (Page 12, lines 1-22 and Figs. 1-5, 7, and 10). The spring assembly 130, 130a, 130b, 132, 132a, 132b is effective to provide force which urges the steering member 66, 66a, 66b toward the straight ahead position when the steering member 66, 66a,

66b is in a position offset from the straight ahead position (Page 12, line 22 to Page 13, line 7; and Figs. 1-5, 7, and 10).

A ball nut 90, 90a, 90b associated with the screw thread portion 70, 70a, 70b of the steering member 66, 66a, 66b is disposed in the chamber 30 in the axle 20, 20a, 20b (Page 9, line 23 to Page 10, line 9; and Figs. 1, 2, 5-7, and 10). An electric motor 78 is connected with the axle 20, 20a, 20b (Page 9, lines 3-5 and Figs. 1, 2, 5-7, and 10). At least one drive member 88 connected with the electric motor 78 and the ball nut 90, 90a, 90b rotates the ball nut 90, 90a, 90b to move the steering member 66, 66a, 66b away from the straight ahead position against the influence of force provided by the spring assembly 130, 130a, 130b, 132, 132a, 132b upon actuation of the electric motor 78 (Page 9, lines 17-22; Page 10, lines 9-15; and Figs. 1, 2, 5-7, and 10).

A motor control system 150, 150a, 150b connected with the electric motor 78 is operative to enable generation of back EMF in the electric motor 78 upon movement of the steering member 66, 66a, 66b toward the straight ahead position under the influence of the spring assembly 130, 130a, 130b, 132, 132a, 132b (Page 14, lines 4-5; Page 17, lines 3-13; and Figs. 1, 7, and 10). The back EMF generated in the electric motor 78 is effective to oppose movement of the steering member 66, 66a, 66b toward the straight ahead position under the influence of force provided by the spring assembly 130, 130a, 130b, 132, 132a, 132b (Page 17, 9-11 and Figs. 1, 7, and 10). A takeoff assembly 98 connected to the steering member 66, 66a, 66b has a portion 120, 122 projecting from an opening 52 in the intermediate portion 50 of the axle 20, 20a, 20b (Page 7, lines 2-8; Page 10, lines 15-21; Page 11, lines 14-16; and Figs. 1-4, 7, and 10). A first steering linkage 124, 124a, 124b connected

with the projecting portion 120, 122 of the takeoff assembly 98 extends along an outer side 28 of the axle 20, 20a, 20b to transmit movement from the takeoff assembly 98 to the first steerable wheel 12, 12a, 12b upon movement of the steering member 66, 66a, 66b and the takeoff assembly 98 along the linear path (Page 5, line 22 to Page 6, line 1; Page 11, lines 14-16; and Figs. 1-6, 7, and 10). The first steering linkage 124, 124a, 124b is pivotally connected to the first steerable wheel 12, 12a, 12b to effect pivotal movement of the first steerable wheel 12, 12a, 12b about the first pivot axis upon movement of the steering member 66, 66a, 66b and the takeoff assembly 98 along the linear path (Page 11, lines 16-23 and Figs. 1-6, 7, and 10).

A second steering linkage 126, 126a, 126b connected with the projecting portion 120, 122 of the takeoff assembly 98 extends along the outer side 28 of the axle 20, 20a, 20b to transmit movement of the takeoff assembly 98 to the second steerable wheel 14, 14a, 14b upon movement of the steering member 66, 66a, 66b and the takeoff assembly 98 along the linear path (Page 5, line 22 to Page 6, line 1; Page 11, lines 16-18; and Figs. 1-6, 7, and 10). The second steering linkage 126, 126a, 126b is pivotally connected to the second steerable wheel 14, 14a, 14b to effect pivotal movement of the second steerable wheel 14, 14a, 14b about the second pivot axis upon movement of the steering member 66, 66a, 66b and the takeoff assembly 98 along the linear path (Page 11, lines 16-23 and Figs. 1-6, 7, and 10).

**VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

- a. Whether the rejection of claims 31, 41, and 42 under 35 U.S.C. 103(a) as being unpatentable over Roberts in view of Rauter is proper.
- b. Whether the rejection of claims 32-36, 39-40, and 60-65 under 35 U.S.C. 103(a) as being unpatentable over Roberts as modified by Rauter and in further view of Ohmura is proper.
- c. Whether the rejection of claim 44 under 35 U.S.C. 103(a) as being unpatentable over Roberts as modified by Rauter and in further view of Shimizu is proper.

**VII. ARGUMENTS**

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). 35 U.S.C. § 103 forbids issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” In making a determination of obviousness under 35 U.S.C.

§103(a):

...the scope and contents of the prior art are determined; the differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

Graham v. John Deere, 383 U.S. 1, 17-18, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966).

Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, *there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.* KSR Int'l Co. v. Teleflex Inc., 2007 U.S. Lexis 4745, 36-37; 75 U.S.L.W. 4289 (2007). Also, the United States Supreme Court in KSR Int'l. Co. V. Teleflex, Inc. noted that the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and that it was "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *Id.*, 82 U.S.P.Q.2d at 1396.

**A. The rejection of claims 31, 41, and 42 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter.**

The rejection of claim 31 is improper and should be reversed for at least the following reasons. The patent to Roberts discloses an electric motor which drives a ball nut and screw arrangement to turn the front wheels of a vehicle. The patent to Rauter discloses a hydraulic motor having a piston which is moved to rotate a sector gear, which is the toothed segment 23, to turn steerable wheels of a vehicle.

**1. The proposed combination of Roberts and Rauter fails to teach or suggest all of the claim limitations of claim 31.**

The proposed combination of Roberts and Rauter does not teach or suggest all of the claim limitations of claim 31. In particular, neither Roberts nor Rauter taken alone or in combination teach or suggest a takeoff assembly having a portion projecting from an opening in an intermediate portion of an axle and being movable along the linear path with a steering member.

Roberts does not disclose a takeoff assembly having a portion projecting from an opening in an intermediate portion of an axle in the manner set forth in claim 31. The patent to Rauter discloses a hydraulic motor disposed within an axle and having a piston with rack gear teeth which are disposed in meshing engagement with gear teeth on a rotatable steering shaft 22. If the piston 18 of Rauter is considered to be a steering member and the rotatable steering shaft 22 is considered to be a takeoff assembly, it is clear that the takeoff assembly is not connected to a first end of the steering member, that is, the piston 18 of Rauter. Furthermore, the takeoff assembly is not movable with the piston along a linear path. Merriam-Webster's Online dictionary defines linear as "of, relating to, resembling, or having a graph that is a line and especially a straight line". The steering shaft 22 of Rauter rotates and does not move along a linear path.

Further, Rauter fails to disclose or suggest a steering member and a takeoff assembly that moves along the linear path of movement of the steering member. In Rauter, the steering shaft 22 moves in a manner that is not along the linear path of movement of the piston 18.

For the reasons set forth above, the rejection of claim 31 under 35 U.S.C. 103(a) as being obvious over Roberts and Rauter fails to establish a prima facie case for obviousness because the proposed combination of Roberts and Rauter does not teach or suggest all of the limitations of claim 31. Therefore, in view of the above-mentioned reasons, claim 31 is allowable.

- 2. There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 31 using Roberts and Rauter.**

Roberts describes an axle 16 connected with a frame 18 by springs 22 and 24. A steering apparatus 12 includes a steering linkage 28 connected with steerable wheels 14. A power steering assembly 32 is operable to actuate the steering linkage to turn the steerable vehicle wheels 14. The axle 16 is located outside the power steering assembly 32. A base end portion 36 of the power steering assembly 32 is connected with the axle 16 and a steering column 38. The opposite end portion 40 of the power steering assembly 32 is connected with the steering linkage 28. The power steering assembly 32 is extended or retracted to actuate the steering linkage 28. An electric motor 50 rotates an output member 62 to rotate a ball nut 64. Rotation of the ball nut 64 moves an output member 66 axially to move a ball and socket joint 68 at the outer end portion 40 of the power steering assembly 32. The base end portion 36 of the power steering assembly 32 is connected with the axle 16 by a ball and socket joint 172. The ball and socket joint 172 transmits motor reaction forces to the axle 16. The ball and socket joint 172 allows the power steering assembly to rotate about a central axis of a ball stud 180 of the ball and socket joint 172 to accommodate motion of the steering linkage 28. The ball stud 180 is also pivotal about a center 192 to further accommodate relative movement between the axle 16 and the steering linkage 28.

Rauter describes an axle body 1 having a differential housing 8 and axial pipes 9. A steering system 6 has a cylinder 17 formed directly by a cylindrical inner wall of the pipe 9. A working piston 18 is slidably guided in the cylinder 17. A piston rod 20 is attached to the piston 18. The piston rod 20 is a toothed rack 21. A



toothed segment connected to a steering shaft 22 meshes with the toothed rack. A longitudinal displacement of the piston 18 causes rotational movement of the steering shaft 22. Rotation of the steering shaft 22 swivels a lever 7 linked with tie rods 5.

Roberts and Rauter teach substantially different steering systems that operate in substantially different ways. Roberts teaches an electric motor for turning steerable wheels and Rauter teaches a hydrostatic assisted steering device. Roberts teaches a manually operated rotatable input shaft and an axially movable output member extending along an axis of a main housing and Rauter teaches rotatable driving shafts extending from a differential housing through pipes 9. Roberts teaches a steering assembly having one axial end connected with an axle and a second axial end connected with steering linkage and Rauter teaches a steering device integrated into an axle body. Roberts teaches a ball and socket joint that transmits motor reaction forces to an axle. Roberts teaches an axially moving an output member to move steerable wheels and Rauter teaches rotating an output member to move steerable wheels. Thus, Roberts and Rauter describe substantially different steering systems that operate in substantially different ways. Accordingly, there is no reason that would have prompted a person of ordinary skill in the relevant field to combine the teachings of Roberts and Rauter in the manner claimed in claim 31.

The Office Action states that it would have been obvious to have modified Roberts steering system and axle assembly with an integral axle assembly in order to provide a more compact steering axle assembly, much like that suggested by Rauter. However, the Office Action fails to indicate how the Roberts steering system

would have been modified to have an integral axle assembly. Specifically, Roberts would need to be substantially modified to include a driving shaft extending through the steering assembly 32. Also, Roberts, specifically teaches a ball and socket joint for transmitting motor reaction forces to an axle. The Office Action fails to indicate how Roberts would have been modified to transmit motor reaction forces to the axle. One of ordinary skill in the art would be lead away from combining Roberts with Rauter.

Furthermore, the Office Action states that it would have been obvious to modify Roberts with the steering linkage setup of Rauter "simply as an alternative position for linking the steering assembly of Roberts ball/nut steering assembly to steerable wheel using an alternative linkage arrangement as suggested by Rauter steering linkage setup". However, this is not a reason that would have prompted a person of ordinary skill in the relevant field to combine Roberts and Rauter. It is a mere conclusory statement.

The Examiner appears to be merely reconstructing the claimed invention from selected pieces of the prior art without any reason. This does not establish obviousness. As stated by the United States Supreme Court in KSR Int'l. Co. V. Teleflex, Inc., "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art."

Also, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). In view of Rauter, one of ordinary skill in the art

would be lead away from substituting the electric motor 50 of Roberts with the hydraulic motor used by Rauter. The hydraulic motor of Rauter can provide substantially greater force to actuate a steering mechanism than the electric motor of Roberts. In addition, Rauter contemplates that a drive shaft 12 will extend through the working piston 18 of the hydraulic motor. It would be impossible to have a drive shaft for a differential gear system extend through the electric motor of Roberts. Furthermore, Roberts contemplates a ball and socket joint for transmitting motor reaction forces to an axle. If Roberts were modified to include an integrated axle assembly, as suggested in the Office Action, there would no longer be a ball and socket joint for transmitting motor reaction forces to the axle. The only reason for combining these two diverse references must have been gleaned from applicant's own disclosure.

The Office Action also fails to indicate how the Roberts steering system would have been modified to incorporate first and second steering linkages connected to a takeoff assembly in an intermediate portion of a chamber as described by Rauter. Specifically, Roberts teaches an axially movable output member and Rauter teaches a rotatable output member. Accordingly, Roberts would need to be substantially modified to include a rotatable output member as described in Rauter.

For the reasons set forth above, the rejection of claim 31 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 31 using Roberts and Rauter. Therefore, in view of the above-mentioned reasons, the rejection of claim 31 under 35 U.S.C. 103(a) should be reversed.

Claims 41 and 42 depend from claim 31. Therefore, the rejection of claims 41 and 42 under 35 U.S.C. 103(a) should also be reversed.

**B. The rejection of claim 32 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 32, which depends from claim 31, should be reversed for the same reasons as claim 31 and also for the feature recited therein. Specifically, claim 32 sets forth a spring assembly as being disposed in the chamber in the axle. The spring assembly biases the steering member toward a straight ahead position.

The proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest a spring assembly disposed in the chamber in the axle and biasing the steering member toward a straight ahead position.

The patent to Ohmura discloses a spring 98 which is disposed in a housing 40. The housing 40 houses a rear wheel turning rod, which extends through the spring 98. The housing 40 of Ohmura is not an axle. The housing 40 of Ohmura does not support steerable wheels of a vehicle. There is no disclosure in any of the references of having a spring assembly disposed in a chamber in an axle to bias a steering member toward a straight ahead position in the manner set forth in claim 32. Therefore, for this additional reason, the rejection of claim 32 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness. Therefore, in view of the above-mentioned reasons, the rejection of claim 32 under 35 U.S.C. 103(a) should be reversed.

**C. The rejection of claim 33 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 33, which depends from claim 31, should be reversed for the same reasons as claim 31 and also for the additional feature recited therein. In particular, claim 33 sets forth a spring assembly disposed in a chamber in the axle. The spring assembly comprises a single spring acting to bias the steering member toward a straight ahead position when the steering member is moved from the straight ahead position.

The proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest this feature. The patent to Ohmura discloses a spring 98 which is disposed in a housing 40. The housing 40 houses a rear wheel turning rod, which extends through the spring 98. The housing 40 of Ohmura is not an axle. The housing 40 of Ohmura does not support steerable wheels of a vehicle. There is no disclosure in any of the references of having a spring assembly disposed in a chamber in an axle to bias a steering member toward a straight ahead position in the manner set forth in claim 33. Therefore, for this additional reason, the rejection of claim 33 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness. Therefore, in view of the above-mentioned reasons, the rejection of claim 33 under 35 U.S.C. 103(a) should be reversed.

**D. The rejection of claim 34 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 34, which depends from claim 33, should be reversed for the same reasons as claim 33 and also for at least the following reasons. In

particular, claim 34 sets forth fixed stops as being disposed in the chamber in the axle and the spring captured between the fixed stops when the steering member is in a straight ahead position. The steering member has movable stops that are movable relative to the fixed stops to compress the spring upon movement of the steering member from the straight ahead position.

**1. A combination of Roberts, Rauter, and Ohmura fails to teach or suggest all of the claim limitations of claim 34.**

The proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the claim limitations of claim 34.

The proposed combination of Roberts and Rauter fails to disclose or suggest the stops as recited in claim 34. The patent to Ohmura discloses a pair of stoppers 100 and 102 (Fig. 2). However, the stoppers 100 and 102 of Ohmura are not disposed in a chamber in an axle which supports first and second steerable wheels of a vehicle. The housing 40 of Ohmura is not an axle. The housing 40 of Ohmura does not support steerable wheels of a vehicle. For the reasons set forth above, the rejection of claim 34 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness because the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the limitations of claim 34.

**2. There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 34 using Roberts, Rauter, and Ohmura.**

There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 34 using Roberts, Rauter,

and Ohmura. In fact, the Office Action has not explicitly set forth any reason to combine Ohmura with Roberts and Rauter in the rejection of claim 34.

Thus, the rejection of claim 34 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter and Ohmura fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 34 using Roberts, Rauter, and Ohmura.

Therefore, in view of the above-mentioned reasons, the rejection of claim 34 under 35 U.S.C. 103(a) should be reversed.

**D. The rejection of claims 35 and 36 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 35, which depends from claim 31, should be allowed for the same reason as claim 31 and also for at least the following reasons. Claim 35 sets forth a spring assembly as being disposed in a chamber in the axle. The takeoff assembly includes a piston located between the ball nut and the spring assembly. The spring assembly is effective to urge the takeoff assembly toward a straight ahead position.

**1. A combination of Roberts, Rauter, and Ohmura fails to teach or suggest all of the claim limitations of claim 35.**

The proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the claim limitations of claim 35. In particular, the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest a takeoff

assembly that includes a piston located between a ball nut and a spring assembly, which is effected to urge the takeoff assembly toward a straight ahead position.

The patent to Ohmura discloses a ball nut 82. The patent to Ohmura also discloses a spring 98. However, the ball nut and spring of Ohmura are not disposed in a chamber in an axle which supports vehicle wheels in the manner set forth in claim 31 from which claim 35 depends. Furthermore, the patent to Ohmura does not disclose a piston which is located between the ball nut and the spring assembly. Roberts and Rauter also do not disclose or suggest this feature recited in claim 35. For the reasons set forth above, the rejection of claim 35 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness because the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the limitations of claim 35.

**2. There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 35 using Roberts, Rauter, and Ohmura.**

There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 35 using Roberts, Rauter, and Ohmura. In fact, the Office Action has not explicitly set forth any reason to combine Ohmura with Roberts and Rauter in the rejection of claim 35.

Thus, the rejection of claim 35 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter and Ohmura fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 35 using Roberts, Rauter, and Ohmura.



Therefore, in view of the above-mentioned reasons, the rejection of claim 35 under 35 U.S.C. 103(a) should be reversed. Claim 36 depends from claim 35. Therefore, the rejection of claim 36 under 35 U.S.C. 103(a) should also be reversed.

**E. The rejection of claim 39 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 39, which depends from claim 31, should be reversed for the same reason as claim 31 and also for at least the following reasons. Claim 39 sets forth a motor control system which is operative to enable the generation of the back EMF in the motor upon movement of the steering member toward the straight ahead position in order to resist movement of the steering member toward the straight ahead position.

**1. A combination of Roberts, Rauter, and Ohmura fails to teach or suggest all of the claim limitations of claim 39.**

The proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the claim limitations of claim 39. In particular, the proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest a motor control system which is operative to enable the generation of the back EMF in the motor upon movement of a steering member toward the straight ahead position in order to resist movement of the steering member toward the straight ahead position. The patent to Ohmura discloses a motor 32 having a brake 46 and a double clutch mechanism 48. The motor 32 of Ohmura does not have a motor control system which is operative to enable the generation of back EMF in a motor in the manner set forth in claim 39. For the reasons set forth above, the rejection of claim 39 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to

establish a prima facie case for obviousness because the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the limitations of claim 39.

**2. There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 39 using Roberts, Rauter, and Ohmura.**

There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 39 using Roberts, Rauter, and Ohmura. In fact, the Office Action has not explicitly set forth any reason to combine Ohmura with Roberts and Rauter in the rejection of claim 39.

Thus, the rejection of claim 39 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter and Ohmura fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 39 using Roberts, Rauter, and Ohmura.

Therefore, in view of the above-mentioned reasons, the rejection of claim 39 under 35 U.S.C. 103(a) should be reversed.

**F. The rejection of claim 40 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 40, which depends from claim 31, should be reversed for the same reasons as claim 31 and also for at least the following reasons. Claim 40 sets forth the electric motor as being located outside the chamber in the axle. The drive member extends through an opening formed in the axle.

**1. A combination of Roberts, Rauter, and Ohmura fails to teach or suggest all of the claim limitations of claim 40.**

The proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the claim limitations of claim 40. In particular, the proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest an electric motor located outside the chamber in the axle and a drive member that extends through an opening formed in the axle.

The patent to Ohmura discloses a reduction gear train 50 which extends through an opening in a housing 40. However, the housing 40 of Ohmura is not an axle which supports vehicle wheels. Roberts and Rauter do not disclose an electric motor located outside a chamber in an axle, as also admitted by the Examiner.

For the reasons set forth above, the rejection of claim 40 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness because the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the limitations of claim 40.

**2. There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 40 using Roberts, Rauter, and Ohmura.**

There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 40 using Roberts, Rauter, and Ohmura. In fact, the Office Action has not explicitly set forth any reason to combine Ohmura with Roberts and Rauter in the rejection of claim 40.

Thus, the rejection of claim 40 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter and Ohmura fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning

to support the legal conclusion of obviousness in the rejection of claim 40 using Roberts, Rauter, and Ohmura.

Therefore, in view of the above-mentioned reasons, the rejection of claim 40 under 35 U.S.C. 103(a) should be reversed.

**G. The rejection of claim 43 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 43, which depends from claim 31, should be reversed for the same reasons as claim 31 and also for at least the following reasons. In particular, claim 43 sets forth a locking member for locking a steering member in a straight ahead position.

**1. A combination of Roberts, Rauter, and Ohmura fails to teach or suggest all of the claim limitations of claim 43.**

The proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest a locking member for locking the steering member in a straight ahead position, as recited in claim 43. Thus, the rejection of claim 43 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness because the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the limitations of claim 43.

**2. There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 43 using Roberts, Rauter, and Ohmura.**

There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 43 using Roberts, Rauter, and Ohmura. In fact, the Office Action has not explicitly set forth any reason to combine Ohmura with Roberts and Rauter in the rejection of claim 43.

Thus, the rejection of claim 43 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter and Ohmura fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 43 using Roberts, Rauter, and Ohmura.

Therefore, in view of the above-mentioned reasons, the rejection of claim 43 under 35 U.S.C. 103(a) should be reversed.

H. **The rejection of claim 60 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 60 under 35 U.S.C. 103(a) as being unpatentable over Roberts as modified by Rauter in further view of Ohmura should be reversed for at least the following reasons. Independent claim 60 is directed to a steering system for a vehicle having steerable wheels. The system includes an axle having end portions which are suspended by springs and which support first and second steerable wheels of a vehicle. A steering member is supported in a chamber in the axle. The steering member is movable between a straight ahead position and positions offset from the straight ahead position of the steering member.

A spring assembly is set forth as being disposed in the chamber in the axle and as being connected with the steering member. The spring assembly is effective to provide force which urges the steering member toward the straight ahead position when the steering member is in a position offset from the straight ahead position. A ball nut is associated with a screw thread portion of the steering member and is disposed in a chamber in the axle. A drive member is connected with the electric

motor and the ball nut to rotate the ball nut to move the steering member away from the straight ahead position against the influence of force provided by the spring assembly upon actuation of the electric motor.

In addition, claim 60 sets forth a motor control system as being connected with the electric motor and operative to enable generation of back EMF in the electric motor upon movement of the steering member toward the straight ahead position under the influence of the spring assembly. The back EMF generated in the electric motor is effective to oppose movement of the steering member toward the straight ahead position under the influence of force applied by the spring assembly.

A takeoff assembly is connected to the steering member. The takeoff assembly has a portion projecting from an opening in the intermediate portion of the axle. A first steering linkage is connected with the projecting portion of the takeoff assembly and extends along the outer side of the axle to transmit movement of the takeoff assembly to the first steerable wheel. A second steering linkage is connected with the projecting portion of the takeoff assembly and extends along the outer side of the axle to transmit movement of the takeoff assembly to the second steerable wheel.

**1. A combination of Roberts, Rauter, and Ohmura fails to teach or suggest all of the claim limitations of claim 60.**

The proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest a spring assembly disposed in the chamber in the axle and being effective to provide force to urge the steering member toward a straight ahead position.

The patent to Ohmura discloses a spring 98 which is disposed in a housing 40. The housing 40 houses a rear wheel turning rod, which extends through the spring 98. The housing 40 of Ohmura is not an axle. The housing 40 of Ohmura does not support steerable wheels of a vehicle. There is no disclosure in any of the references of having a spring assembly disposed in a chamber in an axle and being effective to provide force to urge the steering member toward a straight ahead position in the manner set forth in claim 60.

Further, the proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest a motor control system which is operative to enable the generation of the back EMF in the motor upon movement of a steering member toward the straight ahead position under the influence of the spring assembly, which back EMF is effective to oppose movement of the steering member toward the straight ahead position under the influence of force provided by the spring assembly. The patent to Ohmura discloses a motor 32 having a brake 46 and a double clutch mechanism 48. The motor 32 of Ohmura does not have a motor control system which is operative to enable the generation of back EMF in a motor in the manner set forth in claim 60.

For the reasons set forth above, the rejection of claim 60 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness because the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the limitations of claim 60.

**2. There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 60 using Roberts, Rauter, and Ohmura.**

There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 60 using Roberts, Rauter, and Ohmura. As discussed above, there is no articulated reason with rational underpinning to combine Roberts and Rauter.

Furthermore, there is no articulated reason with some rational underpinning to combine Roberts and Rauter with Ohmura with respect to the feature recited in claim 60 of a motor control system which is operative to enable the generation of the back EMF in the motor upon movement of the steering member toward the straight ahead position under the influence of the spring assembly, which back EMF is effective to oppose movement of the steering member toward the straight ahead position under the influence of force provided by the spring assembly. In fact, the Office Action has not explicitly set forth any reason to combine Ohmura with Roberts and Rauter with respect to this feature.

For the reasons set forth above, the rejection of claim 60 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter and Ohmura fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 60 using Roberts, Rauter, and Ohmura. Therefore, in view of the above-mentioned reasons, the rejection of claim 35 under 35 U.S.C. 103(a) should be reversed.

Claims 61, 63, and 65 depend from claim 60. Therefore, the rejection of claims 61, 63 and 65 under 35 U.S.C. 103(a) should also be reversed.



**I. The rejection of claim 62 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 62, which depends from claim 60, should be reversed for the same reasons as claim 60 and also for at least the following reasons. Claim 62 sets forth the electric motor as being located outside of the chamber in the axle. The drive member extends through an opening formed in the axle.

**1. A combination of Roberts, Rauter, and Ohmura fails to teach or suggest all of the claim limitations of claim 62.**

The proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the claim limitations of claim 62. In particular, the proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest an electric motor located outside the chamber in the axle and a drive member that extends through an opening formed in the axle.

The patent to Ohmura discloses a reduction gear train 50 which extends through an opening in a housing 40. However, the housing 40 of Ohmura is not an axle which supports vehicle wheels. The proposed modification of Roberts with Rauter also does not disclose an electric motor located outside a chamber in an axle, as admitted by the Examiner.

For the reasons set forth above, the rejection of claim 62 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness because the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the limitations of claim 62.

- 2. There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 62 using Roberts, Rauter, and Ohmura.**

There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 62 using Roberts, Rauter, and Ohmura. In fact, the Office Action has not explicitly set forth any reason to combine Ohmura with Roberts and Rauter to provide an electric motor located outside a chamber in an axle and also to provide a drive member that extends through an opening in the axle.

Thus, the rejection of claim 62 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter and Ohmura fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 62 using Roberts, Rauter, and Ohmura.

Therefore, in view of the above-mentioned reasons, the rejection of claim 62 under 35 U.S.C. 103(a) should be reversed.

- J. The rejection of claim 64 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Ohmura.**

The rejection of claim 64, which depends from claim 60, should be reversed for the same reasons as claim 60 and also for the feature that the takeoff assembly is connected to a first end of the steering member for movement therewith along a linear path.

The proposed combination of Roberts, Rauter, and Ohmura does not disclose or suggest this feature. Merriam-Webster's Online dictionary defines linear as "of,

relating to, resembling, or having a graph that is a line and especially a straight line". The steering shaft 22 of Rauter, which is considered to be a takeoff assembly, rotates and does not move along a linear path. For the reasons set forth above, the rejection of claim 64 under 35 U.S.C. 103(a) as being obvious over Roberts, Rauter, and Ohmura fails to establish a prima facie case for obviousness because the proposed combination of Roberts, Rauter, and Ohmura does not teach or suggest all of the limitations of claim 64.

Therefore, the rejection of claim 64 under 35 U.S.C. 103(a) should be reversed.

**K. The rejection of claim 44 under 35 U.S.C. 103(a) as being obvious over Roberts as modified by Rauter and in further view of Shimizu.**

The rejection of claim 44, which depends from claim 31, should be reversed for the same reasons as claim 31 and also for the additional feature recited therein. In particular, claim 44 sets forth a drive member as being a belt which extends partway around the ball nut and partway around an output member connected with the electric motor.

There is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 44 using Roberts, Rauter, and Shimizu. The Office action states that it would have been obvious to modify the steering system of Roberts as modified by Rauter with an alternative drive means such as a belt suggested by Shimizu in place of a gear driven means "simply as a matter of design choice dependent upon users preferences because belts are old and well known alternative drive means in the art". However, this is not a reason that

would have prompted a person of ordinary skill in the relevant field to combine Roberts and Rauter with Shimzu. It is a mere conclusory statement.

The Examiner appears to be reconstructing the claimed invention from selected pieces of the prior art without any reason. This does not establish obviousness. As stated by the United States Supreme Court in KSR Int'l. Co. V. Teleflex, Inc., "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art."

Thus, the rejection of claim 44 under 35 U.S.C. 103(a) as being obvious over Roberts in view of Rauter and Shimizu fails to establish a prima facie case for obviousness, because there is no articulated reason with some rational underpinning to support the legal conclusion of obviousness in the rejection of claim 44 using Roberts, Rauter, and Shimizu. Therefore, in view of the above-mentioned reasons, the rejection of claim 44 under 35 U.S.C. 103(a) should be reversed.

**G. Conclusion**

In view of the foregoing, Appellants respectfully submit that the rejections of claims 31-36, 39-44, and 60-65 should be reversed. Reversal of the rejections of claims 31-36, 39-44, and 60-65 is respectfully requested. Also, claims 37 and 38 are allowable and should no longer be withdrawn since they depend from allowable generic or linking claim 31, and claim 66 is allowable and should no longer be withdrawn since it depends from allowable generic or linking claim 60.

**VIII. CLAIMS APPENDIX**

Appendix A attached contains a copy of the claims on appeal.

**IX. EVIDENCE APPENDIX**

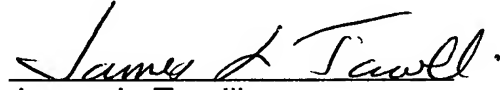
There was no evidence relied upon in this brief that was submitted under 37 CFR §1.130-1.132, or otherwise submitted and entered into the record by the Examiner.

**X. RELATED PROCEEDINGS APPENDIX**

There are no related appeals, interferences or judicial procedures under 37 C.F.R §41.37 91)(i)(ii).

Please charge any deficiency or credit any overpayment in the fees for this Appeal Brief to Deposit Account No. 20-0090.

Respectfully submitted,

  
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**APPENDIX A**

Claims 1-30 (Canceled)

**Claim 31 (Previously Presented)** A steering system for a vehicle having first and second steerable wheels, said steering system comprising:

an axle having first and second end portions which are suspended by springs and which support the first and second steerable wheels of the vehicle, said axle having an intermediate portion which at least partially defines a chamber through which a longitudinal central axis of said axle extends, said first steerable wheel being pivotally mounted on said first end portion of said axle for pivotal movement about a first pivot axis which extends transverse to the longitudinal central axis of said axle, said second steerable wheel being pivotally mounted on said second end portion of said axle for pivotal movement about a second pivot axis which extends transverse to the longitudinal central axis of said axle;

a steering member having a longitudinal central axis, said steering member being supported in said chamber in said axle for movement along a linear path relative to said axle, said steering member having a screw thread portion disposed between first and second ends of said steering member;

a ball nut associated with said screw thread portion of said steering member and disposed in said chamber in said axle;

an electric motor connected with said axle;

at least one drive member connected with said electric motor and said ball nut to rotate said ball nut to move said steering member in said chamber in said axle upon actuation of said electric motor;

a takeoff assembly connected to said first end of said steering member and having a portion projecting from an opening in said intermediate portion of said axle, said takeoff assembly being movable with said steering member along the linear path upon rotation of said ball nut;

first steering linkage connected with said projecting portion of said takeoff assembly and extending along an outer side of said axle to transmit movement from said takeoff assembly to said first steerable wheel upon movement of said steering member and said takeoff assembly along the linear path, said first steering linkage being pivotally connected to said first steerable wheel to effect pivotal movement of said first steerable wheel about said first pivot axis upon movement of said steering member and said takeoff assembly along the linear path; and

second steering linkage connected with said projecting portion of said takeoff assembly and extending along the outer side of said axle to transmit movement of said takeoff assembly to said second steerable wheel upon movement of said steering member and said takeoff assembly along the linear path, said second steering linkage being pivotally connected to said second steerable wheel to effect pivotal movement of said second steerable wheel about said second pivot axis upon movement of said steering member and said takeoff assembly along the linear path.

**Claim 32 (previously presented)** A steering system as set forth in claim 31 further comprising a spring assembly disposed in said chamber in said axle, said spring assembly biasing said steering member toward a straight ahead position.

**Claim 33 (previously presented)** A steering system as set forth in claim 31 further comprising a spring assembly disposed in said chamber in said axle, said spring assembly comprises a single spring acting to bias said steering member toward a straight ahead position when said steering member is moved from the straight ahead position.

**Claim 34 (previously presented)** A steering system as set forth in claim 33 wherein fixed stops are disposed in said chamber in said axle and capture said spring between said fixed stops when said steering member is in the straight ahead position, said steering member having movable stops that are movable relative to said fixed stops to compress said spring upon movement of said steering member from the straight ahead position.

**Claim 35 (previously presented)** A steering system as set forth in claim 31 further comprising a spring assembly disposed in said chamber in said axle, said takeoff assembly comprising a piston located between said ball nut and said spring assembly, said spring assembly being effective to urge said takeoff assembly toward a straight ahead position.



**Claim 36 (previously presented)** A steering system as set forth in claim 35 further comprising stop means spaced apart from said piston and acting between a spring in said spring assembly and said steering member for transmitting biasing force of said spring to said steering member.

**Claim 37 (withdrawn)** A steering system as set forth in claim 31 further including a first spring member acting between said takeoff assembly and said axle, said first spring member biasing said takeoff assembly and thereby said steering member in a first axial direction toward a straight ahead position, and a second spring member acting between said takeoff assembly and said axle, said second spring member biasing said takeoff assembly and thereby said steering member in a second axial direction opposite the first axial direction and toward the straight ahead position.

**Claim 38 (withdrawn)** A system as set forth in claim 31 wherein said takeoff assembly includes a piston member connected with said steering member and supported in said axle for movement with said steering member relative to said axle, said piston member having axially opposed first and second end surfaces, a first spring member acting between said first end surface of said takeoff assembly and said axle, and a second spring member acting between said second end surface of said takeoff assembly and said axle.

**Claim 39 (previously presented)** A steering system as set forth in claim 31 further comprising a motor control system operative to enable the generation of back

EMF in said motor upon movement of said steering member toward the straight ahead position in order to resist movement of said steering member toward the straight ahead position.

**Claim 40 (previously presented)** A steering system as set forth in claim 31 wherein said electric motor is located outside said chamber in said axle, said drive member extends through an opening formed in said axle.

**Claim 41 (previously presented)** A steering system as set forth in claim 31 wherein said steering member is free of rack teeth.

**Claim 42 (previously presented)** A steering system as set forth in claim 31 wherein said electric motor is effective to resist movement of said steering member toward a straight ahead position.

**Claim 43 (previously presented)** A system as set forth in claim 31 further comprising a locking member for locking said steering member in a straight ahead position.

**Claim 44 (previously presented)** A steering system as set forth in claim 31 wherein said drive member is a belt which extends part way around said ball nut and part way around an output member connected with said electric motor.

**Claims 45 – 59 cancelled.**

**Claim 60 (previously presented)** A steering system for a vehicle having first and second steerable wheels, said steering system comprising:

an axle having first and second end portions which are suspended by springs and which support the first and second steerable wheels of the vehicle, said axle having an intermediate portion which at least partially defines a chamber through which a longitudinal central axis of said axle extends, said first steerable wheel being pivotally mounted on said first end portion of said axle for pivotal movement about a first pivot axis which extends transverse to the longitudinal central axis of said axle, said second steerable wheel being pivotally mounted on said second end portion of said axle for pivotal movement about a second pivot axis which extends transverse to the longitudinal central axis of said axle;

a steering member having a longitudinal central axis, said steering member being supported in said chamber in said axle for axial movement relative to said axle, said steering member being movable between a straight ahead position and positions offset from the straight ahead position of said steering member, said steering member having a screw thread portion;

a spring assembly disposed in said chamber in said axle and connected with said steering member, said spring assembly being effective to provide force which urges said steering member toward the straight ahead position when said steering member is in a position offset from the straight ahead position;

a ball nut associated with said screw thread portion of said steering member and disposed in said chamber in said axle;

an electric motor connected with said axle;

at least one drive member connected with said electric motor and said ball nut to rotate said ball nut to move said steering member away from the straight ahead position against the influence of force provided by said spring assembly upon actuation of said electric motor;

a motor control system connected with said electric motor and operative to enable generation of back EMF in said electric motor upon movement of said steering member toward the straight ahead position under the influence of said spring assembly, said back EMF generated in said electric motor being effective to oppose movement of said steering member toward the straight ahead position under the influence of force provided by said spring assembly,

a takeoff assembly connected to said steering member having a portion projecting from an opening in said intermediate portion of said axle;

first steering linkage connected with said projecting portion of said takeoff assembly and extending along an outer side of said axle to transmit movement from said takeoff assembly to said first steerable wheel, said first steering linkage being pivotally connected to said first steerable wheel to effect pivotal movement of said first steerable wheel about said first pivot axis upon movement of said steering member and said chamber in said axle; and

second steering linkage connected with said projecting portion of said takeoff assembly and extending along the outer side of said axle to transmit movement of said takeoff assembly to said second steerable wheel, said second steering linkage being pivotally connected to said second steerable wheel to effect pivotal movement of said second steerable wheel about said second pivot axis upon movement of said steering member in said chamber in said axle.

**Claim 61 (previously presented)** A steering system as set forth in claim 60 wherein said first and second ends of said steering member are disposed in said chamber in said axle.

**Claim 62 (previously presented)** A steering system as set forth in claim 60 wherein said electric motor is located outside said chamber in said axle, said drive member extends through an opening formed in said axle.

**Claim 63 (previously presented)** A steering system as set forth in claim 60 wherein said steering member is free of rack teeth.

**Claim 64 (previously presented)** A steering system as set forth in claim 60 wherein said takeoff assembly is connected to a first end of said steering member for movement therewith along a linear path.

**Claim 65 (previously presented)** A steering system as set forth in claim 60 wherein said spring assembly includes only a single spring acting to bias said steering member toward the straight ahead position when said steering member is in one of said positions offset from the straight ahead position.

**Claim 66 (withdrawn)** A steering assembly as set forth in claim 60 wherein said spring assembly includes a first spring member acting between said takeoff assembly and said axle and a second spring member acting between said takeoff assembly and said axle.

**EVIDENCE APPENDIX**

There was no evidence relied upon in this brief that was submitted under 37 C.F.R. §§1.130-1.132, or otherwise submitted and entered into the record by the Examiner.

**RELATED PROCEEDINGS APPENDIX**

There are no related appeals, interferences, or judicial procedures under 37  
C.F.R. §41.37(1)(c)(ii).